Spring 1989

INLAND LAKES PROGRAM
FILAMENTOUS ALGAE AND ACID RAIN IN ONTARIO LAKES

What are filamentous algae?

Algae are considered the most primitive form of plant life. They are often green containing chlorophyll pigments, but can also be found in other colors.

Filamentous algae grow in long slender ribbons or branches. Several types of algae found in Ontario waters grow in filaments, while others grow in clusters or chains.

Because algae can grow as single microscopic cells separate from each other, their presence in Ontario waters is often not apparent. However, filamentous algae consist of a number of these cells growing in a highly noticeable form and are often likened to "slimy wet hair" or "cotton candy clouds."

The filaments are formed by repeated division of cells without separation from the daughter cells. Branching occurs when the cells grow laterally.

Types of filamentous algae

Thousands of types of algae grow in Ontario's freshwater habitats. They form the base of the food chain, along with microscopic animal forms such as protozoa and bacteria.

A provincewide study indicates that the dominant types of filamentous algae in the near-shore zones of Ontario softwater lakes are species of Mougeotia, Zygogonium and Spirogyra. Within these types of dominant algae are numerous variations differing in appearance, distribution and seasonality.

Where are filamentous algae found?

Filamentous algae are a normal part of water life. They can be free-floating or can attach themselves to rocks, docks, logs or weeds. All are common to shoreline areas. However, studies have shown that some acidic lakes in the Canadian Shield area of Ontario have a higher-than-normal incidence of filamentous algae.

Some species of Mougeotia and Zygogonium for instance, occur in greatest abundance in acidic lakes with pH levels less than 6.5. Other species are restricted to non-acidic lakes with a pH range of 6.5 or higher.

Filamentous algae and acid rain

Although recent advances have been made in understanding the ecology and distribution of filamentous algae in Ontario softwater lakes, it is still uncertain exactly how acidification may cause excessive growth. It seems clear, however, that the lower the pH value of the lake, the greater the chance of finding certain types of filamentous algae in abundance.

One possibility is that some filamentous algae simply thrive better in an acidic environment. Another is that these algae merely accumulate because larger organisms such as crayfish that feed on them disappear with acidification. It is also possible that as a lake's acid content is raised and fewer nutrients become available, algae better able to acquire nutrients at low concentrations gain a competitive advantage.

Experiments with deliberately acidified test lakes have shown that filamentous algae appeared shortly after the acidity of the lake increased. In a lake neutralized by crushed limestone, filamentous algae quickly disappeared. The algae reappeared within two years, however, when the lake began to re-acidify. Laboratory tests have also indicated that certain types of filamentous algae thrive under acidic conditions.

The growth of filamentous algae is also dependent on water temperature and available sunlight. Some grow rapidly in July, peak in August and disappear in September, while others do better in spring and fall when water temperatures are cooler and light intensities lower.

How do they affect us?

Excessive growth of filamentous algae can have a number of unwanted effects. They can foul swimming areas, reduce the appeal of shoreline areas and may affect fish and other lake life. Although these algae make swimming difficult and perhaps hazardous in some instances (e.g. slippery rocks), they generally do not affect human health.

Documenting the problem

In 1986, Environment Ontario surveyed cottagers and residents at more than 200 lakes and about half the lakes surveyed had filamentous algae to some degree. Where lakes were affected by filamentous algae, respondents reported that its presence was the most serious problem affecting their lakes. Preliminary statistical comparisons of water chemistry and other environmental factors suggest that lake acidity is significant in predicting the presence of filamentous algae.

Improved understanding of the distribution of filamentous algae in Ontario lakes and the environmental factors affecting their development provides a basis for testing and implementing measures to prevent or control their growth.